

# **Appendix B10-1**

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Descriptions of CWHR Types

## Appendix BIO-1 Descriptions of California Wildlife Habitat Relationships Types within the Treatable Landscape

CWHR Classification	Ecological Description <sup>1</sup>
<b>Woodland and Forest Habitats</b>	
Aspen	<p>Mature stands of quaking aspen usually have relatively open canopies, often shared with other deciduous trees and a few conifer species, such as pines. Average canopy closures of stands in eastern California range from 60 to 100 percent in young and intermediate aged stands and from 25 to 60 percent in mature stands. Quaking aspens often attain a height of 60 feet and a diameter of 2 feet. Extraordinary trees may reach a height of 100 feet and a diameter of about 3 feet. The open nature of the stands results in substantial light penetration to the ground. Therefore, aspen stands have an herbaceous understory and many have a tall shrub layer. The shrub understory within stands provide nesting cover for several species. The mesic sites that permit aspen to establish also result in higher insect production compared to adjacent forests or shrublands. Such insect production, together with a high rate of fungal infection of trees, is thought to account for the greater variety and abundance of birds in aspen habitats than in adjacent forests and shrublands. Aspen stands are habitats favored by a variety of cavity-nesting birds, such as bluebirds, sapsuckers, downy woodpeckers, and chickadees. Snags are important to cavity nesters in these stands, but live aspens are easily and therefore commonly drilled by excavating species. On the eastern slopes of the Sierra Nevada, aspen stands adjoining sagebrush and other shrub habitats often provide nesting cover for northern goshawks. Following disturbance, succession proceeds rapidly from an herbaceous layer to shrubs and trees, which invade together. The successional status of aspen stands is unsettled. Most authorities regard it as an early seral stage that invades after fire or other disturbances. Consequently, successful, long-term suppression of fires or excessive grazing and browsing by ungulates may result in the eventual disappearance of quaking aspen from an area. Aspen shoots are killed by even low-intensity fires; however, new shoots are subsequently produced from the stem bases. The recruitment and persistence of new shoots depends on disturbances that create conditions suitable for the initiation and growth of new shoots and intervals between disturbances suitable for the survival and growth of shoots. In the absence of disturbance, such as fire, conifers may establish and eventually overtop the shade-intolerant aspens reducing their survival and regeneration</p>
Blue Oak Woodland	<p>Blue oak woodland is a broad-leaved, deciduous woodland habitat. Blue oak comprises 85 to 100 percent cover of the tree canopy and is dominant or codominant with coast live oak, valley oak, interior live oak, California buckeye, or California juniper. Other hardwoods or conifers may be 30 percent of the relative tree canopy cover. The tree canopy may be open, intermittent, or dense, but is typically open except on better-quality sites (e.g., those with deeper soils). The shrub layer is sparse to intermittent and the herb layer is typically sparse to grassy with forbs present seasonally. Blue oak occurs in dry, hilly terrain on soils that are shallow, rocky, infertile, well drained and from a variety of parent materials. It is found along the western foothills of the Sierra Nevada-Cascade Ranges (at elevations of 500 to 2,000 feet), the Transverse and Peninsular Ranges (550 to 4,500 feet elevation), and in the eastern foothills of the Coast Range (between 250- and 3,000-foot elevation), forming a nearly continuous ring around the Central Valley. Many wildlife species benefit from the use of oaks and even enhance oak germination. Mature stages of blue oak woodland are suitable for 29 species of amphibians and reptiles, 57 species of birds, and 10 species of mammals, assuming that other special habitat requirements are met. Acorns buried by scrub jays, yellow-billed magpies, western gray squirrels and California ground squirrels are more likely to germinate because they root better and are less likely to be eaten. Fire return interval is short (5-15 years); however blue oaks are not adequately reproducing themselves and are, therefore, threatened by short fire intervals.</p>
Blue Oak-Foothill Pine	<p>This habitat has vertically and horizontally diverse vegetation structure with a multilayered mix of hardwoods, conifers, and shrubs. The shrub layer is typically composed of several species occurring in clumps and interspersed with patches of grasses and forbs. There are generally small accumulations of dead and downed woody debris and relatively few snags. Blue oak is generally the most abundant species in the tree canopy with taller foothill pines occurring in a sparser layer emerging above the blue oaks. Canopy cover is variable depending on site conditions and ranges from 10 to 59 percent. Found between 500- and 3,000-foot elevation on soils from a variety of well-drained parent materials ranging from gravelly loam to stony clay loam. Blue oak – foothill pine woodlands provide breeding habitats for a large variety of wildlife species. In the western Sierra Nevada, for example, 29 species of amphibians and reptiles, 79 species of birds, and 22 species of mammals find mature stages of this type suitable or optimum for breeding. Most species breed during late winter and early spring a factor to consider when planning management activities. Snags are less common, and hence less critical to wildlife, in this than in other forest types. Most species of cavity-nesting birds, for example, use living oaks. The cavities are often in scars where limbs have broken from the trunk or a main branch and have developed a level of decay that makes them more easily excavated by primary cavity nesters. Acorns are an important food resource for many species of birds and mammals.</p>

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Closed-Cone Pine-Cypress	<p>This CWHR type consists of 16 evergreen, needle-leaved tree alliances each typically dominated by a single species of closed-cone, fire-dependent cypress or pine (e.g., McNab, Sargent, and Monterey cypress and knobcone, beach, and Torrey pine). Generally, on well-drained, shallow, nutrient-poor soils. Many stands (especially of knobcone pine, and Sargent and MacNab cypress) are found on serpentine soils. Although, typically found at low elevations, due to the coastal distribution of much of this habitat type, interior stands may be found at elevations up to 6,550 feet. Landforms are gentle to steep slopes where stands occur in interior California and coastal terraces or bluffs where distributed along coastal California. The height and canopy closure of these alliances are variable and depend upon site characteristics, soil type, stand age, and floristic composition. The cypress trees generally reach a height of 30 to 65 feet over a well-developed shrub layer of chaparral species (chamise and manzanita) on open, well-drained sites and a low, dense cover of shrubs and herbs on poorly drained soils. On low nutrient or serpentine soils, the shrub layer cover is often less than 50 percent. Pine types typically reach heights of about 65 feet. Most of the pine alliances have a shrub layer of chaparral species with high relative cover (up to 100 percent) and a sparse herbaceous layer. Numerous game species, including tree squirrels and band-tailed pigeons, and nongame species make use of this type for feeding and cover. Few species make substantial use of this type as a breeding habitat, although the great horned owl and red-tailed hawk will nest in closed-cone pine forests. After fire, particularly on good sites, both cypress and pine habitats form dense, even-aged stands. As stands mature, the stocking densities decrease, but single-species site dominance is common. Closed-cone pine-cypress habitats found along the extreme coast or on very shallow infertile soils contain stunted, wind-pruned individuals. Closed-cone pines and cypress are true fire-dependent species that retain their seeds in serotinous cones that remain on the branches. The heat of fire causes the cones to release seeds, which fall on the bare mineral soils. The full sunlight provided in early successional stages is excellent for seedling establishment and promotes the dense even-aged stands typical of all types of closed-cone pine and cypress habitats.</p>
Coastal Oak Woodland	<p>Coastal oak woodland is a broad-leaved woodland habitat with an overstory of deciduous and evergreen hardwoods, usually dominated by coast live oak, mixed with valley oak, blue oak, and foothill pine on drier sites, or with California bay, tanbark oak, canyon live oak, and madrone in mesic areas closer to the coast. The tree canopy varies from dense on mesic sites to open woodland or savannah on drier sites. The understory is equally variable and maybe composed of dense, impenetrable thickets of chaparral or coastal scrub shrubs or, more commonly, of scattered shrubs within a grassland understory. This habitat occurs in coastal foothills and valleys on moderately- to well-drained soils that are moderately deep and have low to medium fertility. Coastal oak woodlands provide habitat for a variety of wildlife species, including 60 species of mammals and 110 species of birds, during the breeding season. Quail, turkeys, squirrels, and deer may be so dependent on acorns in fall and early winter that a poor acorn year can result in significant declines in their populations. Therefore, many wildlife managers are concerned over the continuing loss of coastal oak woodland habitats as a result of human activities. Native American burning in the past was important in maintaining some open stands of coastal oak woodland. Natural and manmade fires may still be important in some areas. Southern oak woodlands have apparently experienced an increase in periodicity of fires in recent years. Studies indicate that Engelmann oak and coast live oak are able to survive most fires. Most coastal oak woodlands are comprised of medium to large trees with few seedlings and saplings, especially in heavily grazed areas. Regeneration of most oaks in the coastal oak woodlands has not been studied thoroughly, but it is generally considered that they do not have the serious regeneration problems found with blue oak and valley oak. However, Engelmann oak is not adequately reproducing itself for reasons similar to those of blue oak.</p>

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Douglas Fir	<p>Douglas-fir habitat forms a complex mosaic of forest expression due to the geologic, topographic, and successional variation typical within its range. Typical aggregations include a lower overstory of dense, sclerophyllous, broad-leaved evergreen trees (tanoak, Pacific madrone) up to 114 feet tall, with an irregular, often open, higher overstory of tall needle-leaved evergreen trees (Douglas-fir) up to 295 feet. A small number of pole and sapling trees occur throughout stands. On wet sites, shrub layers are well developed, often with 100 percent cover. Cover of the herbaceous layer under the shrubs can be up to 10 percent. At higher elevations, the shrubs disappear, and the herb layer is often 100 percent. This habitat supports a high abundance of wildlife species. Bird species typical of this habitat include spotted owl, western flycatcher, chestnut-backed chickadee, golden-crowned kinglet, Hutton's vireo, solitary vireo, hermit warbler, and varied thrush. Among amphibians and reptiles, the distributions of northwestern salamander, Pacific giant salamander, Olympic salamander, Del Norte salamander, black salamander, clouded salamander, tailed frog, and northwestern garter snake are largely coincident with the distribution of Douglas-fir habitat. Although not restricted to this habitat, the ensatina is its most abundant amphibian. Typical mammals include fisher, deer mouse, dusky-footed woodrat, western redbacked vole, creeping vole, Douglas' squirrel, Trowbridge's shrew, and shrew-mole. Because of frequent fires, typical climax Douglas-fir habitat is rare. In the absence of disturbance, such stands develop in 80 to over 250 years, depending on site quality. Individual Douglas-fir trees can live to 1,250 years; ages in excess of 750 years are common. Following disturbance, the seedling tree class persists for 5 to 20 years, depending on site quality.</p>
Eastside Pine	<p>The eastside pine habitat is characterized by short to moderate height, 65-115 feet tall pine trees at maturity. Without disturbance, except for naturally occurring fire, a mosaic of even-aged patches develops, with open spaces and dense sapling stands. Oaks or junipers may form an understory, but pure stands of pine also are found. An open stand of low shrubs, less than 6.5 feet, and a grassy herb layer are typical. Crowns of pines are open, allowing light, wind and rain to penetrate, whereas other trees provide more dense foliage. Pine types with shrubby understories have a high degree of vertical diversity, especially when other conifers are present. Large pine branches form good nesting substrates for large raptors. Sites supporting the larger shrub species manzanita and some ceanothus species may become so densely vegetated in the absence of fire that livestock and big game cannot use the areas. Eastside pine stands often form important migratory and winter range for deer. Higher elevation stands with grassy understories near water may be extremely important deer fawning areas and migratory holding areas. Important wildlife species in the eastside pine habitat include the bald eagle, American peregrine falcon, Sierra Nevada red fox, and California bighorn sheep. Logging, bark beetles, root diseases and fire are the major disturbances in the eastside pine type. In general, disturbance favors brush, particularly manzanita and ceanothus. But some kinds of disturbance may eliminate antelope bitterbrush, a desirable deer forage plant that may not be as robust a competitor with trees as are some other shrubs. Open tree stands generally support more vigorous brush or grass understories which may prevent additional tree regeneration for many years. Fire tends to maintain pine stands on sites that will support other conifers. The following understory dominants may be used to identify different eastside pine communities: western juniper, manzanita, several species of ceanothus, big sagebrush, antelope bitterbrush, grass dominance and forb dominance.</p>
Eucalyptus	<p>Nonnative vegetation type planted as windbreaks, fence rows, dense hardwood groves. Naturalized on uplands or bottomlands and adjacent to stream courses up to 1,500 feet in elevation and often occurs in the wildland-urban interface. Range from single-species thickets with little to no shrub understory to scattered trees over well-developed herb and shrub layers, but most commonly form dense, closed-canopy stands. Eucalyptus species are allelopathic and that, combined with heavy litter deposition often inhibit development of significant understory vegetation but annual grasses and weedy forbs may be present. Eucalyptus may encroach on native riparian vegetation. Characteristic species of this habitat include crow, raven, barn owl, and red-tailed and red-shouldered hawks. Eucalyptus are important as roosts, perches, and nest sites for a number of bird species, particularly raptors. Those eucalyptus with stringy bark or a tendency for rapid deposition of litter, create micro habitats for a number of small vertebrate species, including alligator lizard, gopher snake, and woodrat. Most species of eucalyptus are characterized by adaptations that allow them to survive and recover quickly from disturbances like fire. Even if totally killed by some disturbance, many eucalyptus species produce subsurface ground shoots from lignotubers. For nonlignotuber eucalyptus, the ability to seed heavily and produce heavy natural regeneration suggests that this genus has adapted to a constant environment of fire.</p>

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Jeffrey Pine	<p>The structure of the Jeffrey pine forest varies over its distribution. A single tree layer is characteristic of Jeffrey pine stands on moderately dry sites, giving an impression of openness, limited leaf area, light, and heat. On moist and mesic sites, a second tree layer exists which is composed of deciduous hardwood species, whereas on dry sites evergreen hardwood species form the second tree layer. Conifer species provide the second tree layer on xeric sites. Jeffrey pine is the dominant species found in the upper tree layer. It usually forms pure stands but may be associated with ponderosa pine, Coulter pine, sugar pine, lodgepole pine, timber pine, white fir, red fir, incense-cedar, and black cottonwood. Jeffrey pine is intermediate in species richness between warmer forests- at lower elevations and colder forests at higher elevations in the Klamath Mountains and on the west side of the Sierra Nevada. Its species richness exceeds that of the adjacent upper elevation forests and lower elevation woodland and scrub types in both the Transverse and Peninsular Ranges. The value of the Jeffrey pine forest type as a habitat for wildlife is due in large part to the food value of the Jeffrey pine seeds. Pine seeds are included in the diet of more wildlife species than any other genus except oak. The bark and foliage also serve as important food sources for squirrels and mule deer. Jeffrey pine provides vital nesting cover for several species such as nuthatch, brown creeper, woodpecker, and northern flying squirrel. Jeffrey pine stands are self-perpetuating under a regime of periodic surface fires. Old-growth Jeffrey pine stands exhibit an uneven-aged structure. Analysis of fire scars and age structure suggests that prehistoric fires played an important role in regeneration without destroying the overstory; however, in southern California, fires have recently eliminated large areas of Jeffrey pine forest overstory because of accumulated surface fuels. The successional pattern following these fires involves an initial fireweed stage, followed by a shrub stage dominated by ceanothus and manzanita.</p>
Joshua Tree	<p>Joshua tree habitats are characterized as open woodlands of widely scattered Joshua trees with a low to more or less dense community of broad-leaved evergreen and deciduous shrubs found in desert scrub habitats. Joshua trees are rarely found as pure stands but generally are associated with other overstory trees and shrubs. Coexisting overstory species include California juniper, Utah juniper, singleleaf pinyon, and Mojave yucca. Joshua trees provide song perches, lookout posts, and nest sites for birds (e.g., ladder-backed woodpecker, cactus wren, Scott's oriole). The sharp spiny leaves provide protective havens for birds and lizards. The desert night lizard, in particular, requires fallen Joshua tree branches, dead clumps of Joshua trees or other yucca species, or other debris for shelter. The time necessary for Joshua tree habitats to progress through successional stages is not known but most likely relates to precipitation, fire, soil characteristics, and livestock use.</p>
Juniper	<p>Open to dense aggregations of junipers (western, mountain, California, or Utah juniper) growing as arborescent shrubs or small trees dispersed in small clumps or widely scattered. Denser stands commonly have a grassy understory while more open-canopied stands tend to have a shrubby understory. Associated tree and shrub species, depending in part on species of juniper and its distribution, include white fir, Jeffrey and ponderosa pine, singleleaf pinyon pine, curl leaf mountain-mahogany, antelope bitterbrush, and big sagebrush. It occurs on ridges, slopes, valleys, alluvial fans, and valley bottoms on porous, rocky, coarse, sand or silty, and often very shallow soils at elevations of 330 to 10,170 feet. Juniper berries are an important food source for wintering birds. Juniper berries are used in winter by 17 bird species. Juniper foliage is also consumed by several mammals and may be an important food source for some of these animals, especially during harsh winters. Juniper densities have increased in some regions over the last century owing to heavy grazing and reduced fire. Western juniper woodlands generally occur on rocky, shallow soils where tree growth is slower, dominant species are long-lived, and vegetation is relatively patchy. Changes in composition of these communities are slow to occur in the absence of major disturbance and because of the limited and discontinuous fuels in many of these woodlands, stand-replacing fire is a relatively rare event—despite these tree species being vulnerable to mortality from fire. Therefore, the dynamics of these woodlands tend to result in ancient stands with very stable structures.</p>
Klamath Mixed Conifer	<p>Klamath mixed conifer habitat is typically composed of tall, dense to moderately open, needle-leaved evergreen forests with patches of broad-leaved evergreen and deciduous low trees and shrubs. On favorable mesic sites with little disturbance, the habitat is dominated by tall evergreen conifers up to 200 feet in height with a rich shrub layer and well-developed herbaceous layer. On more xeric sites, the habitat is generally open, but very diverse forest land having a well-developed shrub layer. Klamath mixed conifer covers a moderately large area in northwestern California. Extensive glaciation combined with complex geology has led to highly diverse vegetation, soils and wildlife habitats. A wide array of nesting and feeding opportunities and thermal cover for wildlife has resulted. Rare, threatened or endangered wildlife in this habitat include spotted owl, peregrine falcon, wolverine, and Siskiyou salamander. The mixed conifer communities of the eastern Klamath region are stable, with frequent light fires. The mixed conifer communities of the western Klamath region are usually burned enough to revert to the montane chaparral type.</p>

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Lodgepole Pine	Lodgepole pine typically forms open stands of similarly sized specimens in association with few other species and with a sparse understory. On fertile sites, trees can reach a height of 130 feet, but typically a stand consists of groups averaging 40 to 65 feet in height. Lodgepole pine stands have low structural diversity and are relatively low in animal species. Many species found in lodgepole pine stands are associated with the meadow edge. The Lodgepole habitat provides suitable habitat for 6 reptiles and amphibians, 49 birds, 35 mammals. These species include wolverine, goshawk, bald eagle, and prairie falcon. Three major disturbances affect lodgepole pine in California: fire, insects, and logging. These disturbances create openings of various sizes that lodgepole pines rapidly recolonize. The stages of vegetation change are primarily the result of increased tree density, canopy cover, and size. Beetle infestation creates large quantities of fuel that increase the probability of wildfire.
Montane Hardwood	Montane hardwood occupies the largest spatial component of the hardwood forest subtype in California and is perhaps the most variable of any California forest type. The dominant oak species vary by topography, soils, and elevation. Montane hardwood forests typically lack blue oaks and valley oaks. The characteristic oaks are canyon live oak, interior live oak, California black oak, and Oregon white oak. Bird and animal species characteristic of the montane hardwood habitat include disseminators of acorns (scrub and Steller's jays, acorn woodpecker, and western gray squirrel) plus those that utilize acorns as a major food source. Species found in montane hardwood habitat include wild turkey, mountain quail, band-tailed pigeon, California ground squirrel, dusky-footed woodrat, black bear, and mule deer, Mount Lyell salamander, ensatina and relictual slender salamander, western fence lizard, and sagebrush lizard. Snakes include rubber boa, western rattlesnake, California mountain kingsnake, and sharp tailed snake. Characteristic oaks of the montane hardwood habitat can sprout vigorously from stumps, allowing rapid re-establishment after a fire. Frequent fires over relatively small areas result in a variety of age classes across the landscape.
Montane Hardwood-Conifer	Montane hardwood-conifer habitat includes both conifers and hardwoods, often as a closed forest. To be considered montane hardwood-conifer, at least one-third of the trees must be conifer and at least one-third must be broad-leaved. The habitat often occurs in a mosaic-like pattern with small pure stands of conifers interspersed with small stands of broad-leaved trees. This diverse habitat consists of a broad spectrum of mixed, vigorously growing conifer and hardwood species. This habitat is climax in most cases; however, it can occur as a seral stage of mixed conifer forests. Montane hardwood-conifer provides habitat for a variety of wildlife species. Mature forests are valuable to cavity nesting birds. Moreover, mast crops are an important food source for many birds as well as mammals. Canopy cover and understory vegetation are variable which makes the habitat suitable for numerous species. In mesic areas, many amphibians are found in the detrital layer. Due to geographic variation in components of montane hardwood-conifer, caution must be exercised when predicting wildlife species use. Vegetation response following disturbance, such as fire or logging, begins with a dense shrubby stage dominated by taller broad-leaved species. The stand gradually increases in height, simultaneously developing into two canopy strata with faster growing conifers above and broad-leaved species below. On mesic sites the conifer component overtakes the hardwood component more rapidly than on xeric sites, where the hardwood component is dominant longer.

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Montane Riparian	<p>The vegetation of montane riparian zones is quite variable and often structurally diverse. Usually, the montane riparian zone occurs as a narrow, dense grove of broad-leaved, winter deciduous trees up to 98 feet tall with a sparse understory. In northwest California along streams west of the Klamath Mountains, black cottonwood is a dominant hardwood. In some areas, it is codominant with big leaf maple. In either case, black cottonwood can occur in association with dogwood and boxelder. At high elevations, black cottonwood occurs with quaking aspen and white alder. In northeastern California, black cottonwood, white alder and thin leaf alder dominate the montane riparian zone. Oregon ash, willow and a high diversity of forbs are common associates. In the Sierra Nevada, characteristic species include thin leaf alder, aspen, black cottonwood, dogwood, wild azalea, willow, water birch (southern Sierra east of the crest), and white alder. In the southern Coast Range as well as Transverse and Peninsular ranges, big leaf maple and California bay are typical dominants of montane riparian habitat. Fremont cottonwood is the most dominate cottonwood in the Sierra below 5000 feet, much of the Coast Ranges and the Transverse and Peninsular ranges. All riparian habitats have an exceptionally high value for many wildlife species (Thomas 1979, Marcot 1979, Sands 1977). Such areas provide water, thermal cover, migration corridors and diverse nesting and feeding opportunities. The shape of many riparian zones, particularly the linear nature of streams, maximizes the development of edge which is so highly productive for wildlife (Thomas 1979). The range of wildlife that uses the MRI habitat for food, cover and reproduction include amphibians, reptiles, birds and mammals. The southern rubber boa and Sierra Nevada red fox are among the rare, threatened or endangered wildlife that use montane riparian habitats during their life cycles. Riparian ecosystem dynamics are closely related to disturbance and flow regimes and fires and floods are important disturbances affecting riparian vegetation. Many riparian-associated plants depend on specific hydrologic events before, during, and immediately following their seed release periods. Many species, especially species that are small-seeded and shade-intolerant, such as cottonwood and willows, require establishment sites that are largely free of competition from existing vegetation. Erosion and deposition of sediment along stream channels and on floodplains creates these suitable conditions. In the absence of fire and flood disturbance, shade-tolerant conifers may establish within riparian areas and eventually overtop shade-intolerant riparian shrubs and trees, substantially reducing their growth and survival.</p>
Pinyon-Juniper	<p>Pinyon-juniper habitat typically is open woodland of low, round crowned, bushy trees that are needle-leaved, evergreen, and depending on site suitability, range from less than 30 feet to 50 feet in height. Crowns of individual trees rarely touch and canopy cover generally is less than 50 percent. These open groves of overstory trees often have a dense to open layer of shrubs reaching heights of 5 feet. Low herbaceous plants may also be present in this habitat. Stand structure varies depending on site quality and elevation. Pinyon-juniper forms dense cover on favorable sites with little disturbance, whereas on drier sites, spacing between trees increases and tree size decreases. At low elevations, pinyon-juniper stands are rather open, becoming denser at higher elevations. At maximal elevations, this habitat grades rapidly into adjacent habitats. Pinyon-juniper habitat generally occurs at middle elevations adjoining a number of other wildlife habitats. At lower elevations, pinyon-juniper may interface with habitats such as Joshua tree and desert scrub. At higher elevations, habitats such as eastside pine, perennial grass, and Jeffrey pine border on pinyon-juniper. At similar elevations in more southerly latitudes, sagebrush, mixed chaparral, and chemise-redshank chaparral are found adjacent to pinyon-juniper. Characteristic species of this habitat include pinyon mouse, bushy-tailed woodrat, pinyon jay, plain titmouse, and bushtit. Many wildlife species serve as dispersal agents for pinyon nuts and juniper berries.</p>
Ponderosa Pine	<p>The ponderosa pine habitat includes pure stands of ponderosa pine as well as stands of mixed species in which at least 50% of the canopy area is ponderosa pine. Associated species vary depending on location in the state and site conditions. Typical tree associates include white fir, incense-cedar, Coulter pine, Jeffrey pine, sugar pine, Douglas-fir, bigcone Douglas-fir, canyon live oak, California black oak, Oregon white oak, Pacific madrone and tanoak. Ponderosa pine sometimes is a transitional or migratory habitat for deer and can be extremely important to deer nutrition in migration holding areas. A mixture of early and late successional stages closely interspersed probably will provide good general wildlife habitat but riparian zones, deer migratory routes and holding areas require special consideration during management planning. The California condor uses the ponderosa pine habitat from Madera and Santa Clara Counties southward. Moreover, the Sierra Nevada red fox, Siskiyou mountain salamander and Shasta salamander also are found in the habitat. Most ponderosa pine stands that include other coniferous trees probably are maintained by periodic ground fires. In many of these stands, crown fires result in dense montane chaparral communities. Young, dense stands, as in plantations, exclude most undergrowth once trees attain a closed canopy. Prior to that, dense brush is typical, but an herbaceous layer may develop on some sites.</p>

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Red Fir	<p>Mature red fir stands normally are monotypic, with very few other plant species in any layer. Heavy shade and a thick layer of duff tends to inhibit understory vegetation, especially in dense stands. To the north, in the Klamath Mountains, red fir gives way to noble fir. Red fir habitats throughout California provide food or cover for at least one season to a total of 169 wildlife species (8 amphibians, 4 reptiles, 104 birds including 15 waterbirds, and 53 mammals). Red fir habitats can be considered very important for 28 birds and 26 mammals. Of special note are goshawk (sensitive species); blue grouse (game species); great gray owl, red fox, pine marten, and wolverine. Stand structure is typified by even-aged (established within 20-year span) groups of trees that cover several to hundreds of acres. The cause of this pattern is probably a history of recurrent lightning fires, wind throws, and insect outbreaks acting to kill groups of trees. In the shrub/sapling stage, large brush fields may develop after hot wildfires and are dominated by Ceanothus or other shrub species for many years.</p>
Redwood	<p>The redwood habitat is a composite name for a variety or mix of conifer species that grow within the coastal influence zone (31 mi) from the coast. In the north coast region of California within 2.5 mi of the coast, the redwood habitat consists of Sitka spruce, grand fir, redwood, red alder, and Douglas-fir. Western red cedar and western hemlock are also associates but seldom comprise the major portion of a stand. Redwood becomes dominant along coastal areas approximately 2 to 10 miles from the ocean where Douglasfir, red alder, and grand fir are its major associates. Further inland, Douglas-fir becomes dominant with tan oak and madrone as the major associates. The climax stage of the redwood habitat is distinguished by a bi-layered canopy, usually with redwood or Douglas-fir as the dominant species. Redwood habitats provide food, cover, or special habitat elements (for at least one season) for 193 wildlife species. This total is comprised of 12 reptiles, 18 amphibians, 109 birds, and 54 mammals. Of these species, 18 are considered harvest species. Moreover, a variety of sensitive species are found in the habitat. Species such as the red-legged frog, ensatina, osprey, ringtail, fisher and marbled murrelet show a relatively high preference for various redwood habitat phases and stages. To a minor extent, sensitive species such as the peregrine falcon, pileated woodpecker, spotted owl, and northern flying squirrel can be found, but are usually vagrants in the habitat. Redwood is a self-perpetuating habitat, with or without fire as a disturbance. Fire and flooding in the redwood ecosystem play a major role in terms of reproduction and plant succession. When fire is introduced, various plant species are affected, ultimately altering the habitat stage.</p>
Sierran Mixed Conifer	<p>Five conifers and one hardwood typify the Sierran mixed conifer forest: white fir, Douglasfir, ponderosa pine, sugar pine, incense-cedar, and California black oak. White fir tends to be the most ubiquitous species (though most often a minor overstory component) because it tolerates shade and has the ability to survive long periods of suppression in brush fields. Douglas-fir dominates the species mix in the north but is absent south of the Merced River. Ponderosa pine dominates at lower elevations and on south slopes. Jeffrey pine commonly replaces ponderosa pine at high elevations, on cold sites, or on ultramafic soils. Red fir is a minor associate at the highest elevations. Sugar pine is found throughout the mixed conifer type. Black oak is a minor, but widespread, component in mixed conifer stands. Though black oak does best on open sites, it can be maintained under adverse conditions such as shade, ridge tops, and south slopes where conifers may regenerate in its shade. In the central and particularly southern Sierra Nevada, giant sequoia is a striking associate of the mixed conifer type. White fir, incense-cedar, and sugar pine are associated with the mesic giant sequoia sites. The mixed conifer forest supports some 355 species of animals. Variety in plant species composition provides diversity in food and cover. Black oak acorns, berries from a variety of shrubs (e.g., deerbrush), and a great number of grasses and forbs provide the forage resource essential for wildlife. Frequent fire has historically exerted a strong influence on forest structure in the Sierra Nevada, where fires occurred at intervals of 2 to 20 years with shorter intervals in pine-dominated stands and longer intervals in fire dominated stands and at higher elevations.</p>

## Appendix BIO-1 Descriptions of California Wildlife Habitat Relationships Types within the Treatable Landscape

CWHR Classification	Ecological Description <sup>1</sup>
Subalpine Conifer	<p>Several species dominate canopies of the subalpine conifer type in different localities, either singly or in mixtures of two or more species. These include Engelmann spruce, subalpine fir, mountain hemlock, western white pine, lodgepole pine, whitebark pine, foxtail pine, bristlecone pine, and limber pine. Although typically of minor importance, a shrub understory may include Parry manzanita, squaw currant, purple mountain heather, oceanspray, and big sagebrush. Willows, western huckleberry, California huckleberry, Sierra bilberry, and alpine laurel occur on moist sites. Western wheatgrass, California brome, several species of lupines, and a variety of flowering annuals are common in the sparse ground cover. Coniferous forests at high elevations in California typically support fewer species of amphibians, reptiles, birds, and mammals than any other major forest type in the State. The reasons, though, not clearly established, probably involve some combination of climate, short growing season, lower primary productivity, moisture stress, and lower production of insects and other invertebrates that provide food resources for many vertebrates. Excluding species dependent on ponds, lakes, streams, or cliffs, no amphibians and only one reptile find conditions suitable for breeding in these high-elevation forests, and only 17 species of birds, 15 of mammals, and 22 mammals find conditions optimum or suitable for breeding in such forests, including the great gray owl, pileated woodpecker, marten, and wolverine.</p>
Valley Foothill Riparian	<p>Dominant species in the canopy layer of valley foothill riparian are cottonwood, California sycamore and valley oak. Sub-canopy trees are white alder, boxelder and Oregon ash. Typical understory shrub layer plants include wild grape, wild rose, California blackberry, blue elderberry, poison oak, button brush, and willows. The herbaceous layer consists of sedges, rushes, grasses, miner's lettuce, Douglas sagewort, poison-hemlock, and hoary nettle. Valley-foothill riparian habitats are found in valleys bordered by sloping alluvial fans, slightly dissected terraces, lower foothills, and coastal plains. They are generally associated with low velocity flows, flood plains, and gentle topography. Valleys provide deep alluvial soils and a high-water table. Valley-foothill riparian habitats provide food, water, migration and dispersal corridors, and escape, nesting, and thermal cover for an abundance of wildlife. At least 50 amphibians and reptiles occur in lowland riparian systems. Many are permanent residents, others are transient or temporal visitors. 147 bird species were recorded in 1985 as nesters or winter visitants of this habitat type. Additionally, at least 55 species of mammals are known to use California's Central Valley riparian communities. Riparian ecosystem dynamics are closely related to disturbance and flow regimes and fires and floods are important disturbances affecting riparian vegetation. Many riparian-associated plants depend on specific hydrologic events before, during, and immediately following their seed release periods. Many species, especially species that are small-seeded and shade-intolerant, such as cottonwood and willows, require establishment sites that are largely free of competition from existing vegetation. Erosion and deposition of sediment along stream channels and on floodplains creates these suitable conditions. In the absence of fire and flood disturbance, shade-tolerant conifers may establish within riparian areas and eventually overtop shade-intolerant riparian shrubs and trees, substantially reducing their growth and survival.</p>
Valley Oak Woodland	<p>Valley oak woodland habitat varies from savanna-like to forest-like stands with partially closed canopies, comprised mostly of winter-deciduous, broad-leaved species. Denser stands typically grow in valley soils along natural drainages. Tree density decreases with the transition from lowlands to the less fertile soils of drier uplands. Exceptions to this pattern are known, especially in the central coastal counties. Similarly, the shrub layer is best developed along natural drainages, becoming insignificant in the uplands with more open stands of oaks. Valley oak stands with little or no grazing tend to develop a partial shrub layer of bird disseminated species, such as poison-oak, toyon, and coffeeberry. Canopies of these woodlands are dominated almost exclusively by valley oaks. These woodlands provide food and cover for many species of wildlife. Oaks have long been considered important to some birds and mammals as a food resource (i.e., acorns and browse). The ranges of about 80 species of mammals in California show substantial overlap with the distribution of valley oaks. There are 30 bird species known to use oak habitats in and several, such as fox and western gray squirrels and mule deer, have been documented using valley oaks for food and shelter. Valley oaks are tolerant of flooding, and young trees will sprout when fire damaged.</p>

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CWHR Classification	Ecological Description <sup>1</sup>
White Fir	<p>The White Fir habitat is characterized by nearly monotypic even aged overstory. Mature white fir stands, normally monotypic, with more than 80 percent occurring as white fir, are found throughout California; from the Klamath Mountains along the north coast to the south coast mountain ranges, and in interior ranges from the Warner Mountains in the Great Basin to the Clark, Kingston, and New York mountain ranges in interior southern California. White fir is the preferred tree species for insect-gleaning yellow-rumped warblers, and western tanagers and is also commonly used by other insect-gleaning birds, such as mountain chickadee, chestnut-backed chickadee, golden-crowned kinglet, and black-headed grosbeak. As stands of white fir mature, a high percentage of defective trees are found, the result of windthrow and heart rot fungus. Excellent habitat is provided for snag and cavity dependent wildlife species, particularly when breaks occur between 15-30 m (50-100 ft). The additional benefit of heart rot is the cylindrically stable snag created as a result of the rot moving from the inside of the tree to the outer diameter. Fire influences the white fir habitat by causing a mosaic of even-aged stands in different successional stages.</p>
<b>Chaparral and Scrub Habitats</b>	
Alkali Desert Scrub	<p>Alkali scrub vegetation generally occurs at lower to middle elevations and interdigitates with a number of other arid and semiarid wildlife habitats. At lower elevations, alkali scrub may intermingle with barren salt flats and desert scrub; and in the southern part of its range, palm oasis. At lower-middle elevation alkali scrub may interface with Joshua tree; and at upper middle elevations, with juniper, pinyon-juniper, sagebrush, low sagebrush, and bitterbrush. Throughout its range, desert wash and desert riparian may occur within the alkali scrub. In the San Joaquin Valley, alkali scrub borders on annual grassland habitat. In many locations, alkali scrub overlaps with perennial grassland. Characteristic species of the shadscale aspect of the xerophytic phase of Alkali Scrub include the pallid kangaroo mouse, chisel-toothed kangaroo rat, zebra-tailed lizard, and the San Emigdio blue butterfly, whose host plant is fourwing saltbush. Characteristic species of other aspects of Alkali Scrub habitat are the Mojave ground squirrel, zebra-tailed lizard, and long-nosed leopard lizard.</p>
Bitterbrush	<p>Bitterbrush stands range from small, widely spaced shrubs to large, closely spaced shrubs with more than 90 percent canopy cover. Stands usually contain 300 to 1200 per acre. Bitterbrush is only occasionally found in pure stands. Antelope bitterbrush often Short-needled conifer WHR habitat types in State Responsibility Areas (SRA) occurs as a codominant with big sagebrush or rubber rabbitbrush. It is also found with gray horsebrush, Douglas rabbitbrush, Mormon tea, curlleaf mountain mahogany, and desert peach. Overstory species found in Bitterbrush habitats are ponderosa or Jeffrey pine, lodgepole pine, or western juniper. Understory herbaceous plants vary greatly in composition and density; examples include Idaho fescue, bottlebrush squirreltail, needlegrass, bluebunch wheatgrass, eriogonum, and phlox. The total understory usually makes up less than 10 percent cover. Desert bitterbrush is found mixed with big sagebrush, fourwing saltbush, creosotebush, rubber rabbitbrush, Mormon tea, spiny hopsage, and, on the north end of its range, antelope bitterbrush. Overstory species commonly found with desert bitterbrush are Utah juniper, singleleaf pinyon, Joshua tree, and, at higher elevations, Jeffrey pine. Some of the common understory species are Thurber needlegrass, eriogonum, common snakeweed, and big galleta. These usually total less than 5 percent ground cover. Bitterbrush is highly digestible and contains desirable levels of moisture, calcium, phosphorus, and fat. It tolerates considerable browsing. Its leaves and twigs are favored by mule deer, pronghorn, cattle, sheep, and horses. Antelope bitterbrush exceeds the minimum level of required protein for mule deer, even in winter when it is especially important in the deer diet. It exceeds 17 percent crude protein during the period of rapid growth in early June. Many species of birds, rodents, and insects use seeds. Birds also eat the loopers and tent caterpillars that feed on the vegetative parts of bitterbrush. Some of the more characteristic wildlife species found in bitterbrush habitat include the western fence lizard, gray flycatcher, Brewer's blackbird, green-tailed towhee, jackrabbits, least chipmunk, Belding's ground squirrel, kangaroo rats, and badger. Bitterbrush reproduces sexually by seeds, vegetatively by stem layering, and by sprouting after fire or mechanical damage. However, bitterbrush is very susceptible to fire mortality and is a weak sprouter at best; sprouting ability is variable depending on ecotype, shrub age, fire intensity and season, soil texture, geographic location, and shrub morphology with decumbent forms sprouting more successfully than columnar forms (Zlatnik 1999). The seed bank generally survives even high intensity fires, though, and seed germination and growth is generally very successful on exposed mineral soils where competition has been reduced by fire. However, recovery of bitterbrush following fire generally takes 20 years or more (Zlatnik 1999), and as discussed previously for the big sagebrush scrub community, bitterbrush-big sagebrush scrub may convert to other vegetation types in the presence of frequent fires.</p>

## Appendix BIO-1 Descriptions of California Wildlife Habitat Relationships Types within the Treatable Landscape

CWHR Classification	Ecological Description <sup>1</sup>
Chamise-Redshank Chaparral	<p>Fire occurs regularly in chamise-redshank chaparral and influences habitat structure. Mature chamise-redshank chaparral is single layered, generally lacking well-developed herbaceous ground cover and overstory trees. Chamise-redshank chaparral may consist of nearly pure stands of chamise or redshank, a mixture of both, or with other shrubs. Fire is the primary disturbance initiating secondary succession in chamise-redshank chaparral. Annuals, perennial herbs, and subshrubs are abundant for several years after a fire. Shrubs begin to appear either as seedlings or rootcrown sprouts beginning the first growing season after burning. As the habitat matures, shrub cover and height increase and herbaceous cover declines. Wildlife species found in this habitat type also are found in either mixed chaparral, montane chaparral, coastal scrub, or sagebrush and in shrubs beneath several woodland and forest types. The primary land management consideration is selection of alternative fire management treatments. Long-term fire suppression can lead to stand senescence and declines in deer, small mammals, birds, and reptiles. Most animal populations reach peak densities in the first two or three decades, frequently 1 to 15 years, after a fire. Repeated fires at short intervals could favor crown-sprouting shrubs over obligate seed sprouters. Either management extreme could have long-term impacts on wildlife through changes in nutrient availability, soil quality or vegetation composition, structure, and recovery time. Prescribed burning can be an effective management tool, but the effects vary with season of burn. Post-fire herbs may be important in immobilizing nitrogen within the chaparral system. Protecting these herbs from grazing may be important for effective long-term habitat maintenance. Populations of most small vertebrates decline sharply or are eliminated when chaparral is converted to grassland. Active and passive chaparral management programs must tailor management prescriptions to specific site characteristics and project goals.</p>
Coastal Scrub	<p>Structure of the plant associations that comprise coastal scrub is typified by low to moderate-sized shrubs with mesophytic leaves, flexible branches, semi-woody stems growing from a woody base, and a shallow root system. No single species is typical of all coastal scrub stands. As with structure, composition changes most markedly with progressively more xeric conditions from north to south along the coast. With the change from mesic to xeric sites, dominance appears to shift from evergreen species in the north to drought-deciduous species in the south. Variation in coastal influence at a given latitude produces less pronounced composition changes. Two types of northern coastal scrub are usually recognized. The first type (limited in range) occurs as low-growing patches of bush lupine and many-colored lupine at exposed, oceanside sites. The second and more common type of northern coastal scrub usually occurs at less exposed sites. Here coyotebush dominates the overstory. Other common overstory species are blue blossom ceanothus, coffeeberry, salal, bush monkeyflower, blackberry, poison-oak and wooly sunflower. Bracken fern and swordfern are dominant in the understory; common cowparsnip, Indian paintbrush, yerba buena and California oatgrass are typically present. Around Half Moon Bay, western hazelnut, Pacific bayberry, and sagebrush are also present. A fairly common species in all three types is California sagebrush. The most mesic area, from Mt. Diablo south to Santa Barbara, is dominated by black sage and California buckwheat. In the less mesic region from Santa Barbara south to Orange County, purple sage and California buckwheat join black sage in importance. Golden yarrow, isocoma, rolled leaf monkeyflower, and California encelia are typical. Chaparral yucca is found on the slightly drier sites within the region, especially in Ventura County. The southernmost stands are the most xeric of the form. Composition here is characterized by succulent species and a distinct Baja California influence. In addition to the California sagebrush, California buckwheat, and wooly sunflower typical of the stands farther north, California adolphia, coastal agave, and cunyado are present south of San Diego. Little is known about the importance of coastal scrub habitat to wildlife, though vegetation productivity is lower in coastal scrub than in adjacent chaparral habitats. Coastal scrub appears to support numbers of vertebrate species roughly equivalent to those in surrounding habitats. See biological resources setting section for fire ecology information.</p>
Desert Scrub	<p>Desert scrub habitats typically are open, scattered assemblages of broadleaved evergreen or deciduous microphyll shrubs. Creosotebush is often considered a dominant of desert scrub habitats but its dominance is usually owing to its tall stature rather than density. Desert shrub habitats support a variety of wildlife species. Presence of standing water in winter and growth of herbaceous plants in spring, provide foraging areas and food for species in these seasons. Primary resident species are reptiles or rodents, however other taxa are represented. Typical species include Couch's spadefoot toad, desert tortoise, a variety of lizards and snakes including the desert iguana and common kingsnake, black-throated sparrow, various pocket mice and kangaroo rats, kit fox, coyote and bobcat. After disturbance, such as fire, desert scrub habitats proceed slowly through succession. No definitive recovery rates are known. Desert scrub habitats occur at relatively low elevations.</p>

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CWHR Classification	Ecological Description <sup>1</sup>
Desert Succulent Shrub	Desert succulent shrub habitats typically are low, open shrublands dominated (at least visually) by stem or other succulent plants. When Joshua trees are present in any number the habitat is considered a Joshua tree habitat. Development of desert succulent shrub habitats is relatively slow because many of the more conspicuous plant species are slow growing. The time required to proceed through the successional stages is not fully known; but is probably quite variable depending on climatic and soil factors as well as plant species comprising the habitat. Desert succulent shrub habitats have greater floral diversity and structural complexity than most surrounding areas. These characteristics result in greater animal densities and more wildlife species than in adjacent habitats.
Low Sage	Low sage habitat is typically dominated by either low sagebrush or black sagebrush, often in association with Douglas rabbitbrush, antelope bitterbrush, or big sagebrush; black sagebrush is also commonly associated with winterfat and Mormon-tea. Western juniper may be sparsely scattered in stands dominated by low sagebrush, and Utah juniper and singleleaf pinyon are sometimes scattered in stands dominated by black sagebrush. Common grass species include Sandberg bluegrass, bluebunch wheatgrass, bottlebrush squirreltail, Thurber needlegrass, and Idaho fescue. A rich variety of forbs is usually present. The abundance and distribution of associated plants is highly influenced by soils and precipitation. Excluding species dependent on ponds lakes, marshes, and cliffs commonly found in northeastern California, there are 28 species of terrestrial vertebrates that find conditions optimum for breeding in typical stands of low sage (<20% shrub cover), including chukar, burrowing owl, rock wren, and pronghorn. There are 37 additional species that find conditions suitable for breeding in typical stands, including sage grouse, mourning dove, and kit fox. In addition, several species of raptorial birds find ideal hunting grounds in stands of low sagebrush. These stands tend to lose their snow cover earlier in spring than surrounding habitats; thus, they provide an especially important source of new, green forage for pronghorn and mule deer. Wildfire, grazing by large herbivores, and defoliation by larvae of the moth <i>Aroga websterii</i> undoubtedly contributes to stand renewal in the pristine sagebrush steppe of California. However, disturbance of these habitats today apparently results in their replacement by other relatively stable plant communities, completely changing their successional pattern. Indeed, cheatgrass has invaded all potential sagebrush steppe communities of northeastern California, changing succession in an entire vegetation type. Overgrazed stands are reduced to stark shrub communities with much bare ground between the low shrubs. Such stands are readily invaded by medusahead and cheatgrass, increasing their susceptibility to wildfires. Thus, if the non-sprouting shrubs are destroyed, the site becomes dominated by medusahead or cheatgrass indefinitely.
Mixed Chaparral	Mixed chaparral is a structurally homogeneous brushland type dominated by shrubs with thick, stiff, heavily cutinized evergreen leaves. Shrub height and crown cover vary considerably with age since last burn, precipitation regime (cismontane vs. transmontane), aspect, and soil type. At maturity, mixed chaparral typically is a dense, nearly impenetrable thicket with greater than 80 percent absolute shrub cover. Mixed chaparral is a floristically rich type that supports approximately 240 species of woody plants. Composition changes between northern and southern California and with precipitation regime, aspect, and soil type. Dominant species in mixed chaparral include scrub oak, chaparral oak, and several species of ceanothus and manzanita. No wildlife species are restricted to mixed chaparral. Most species are found in other shrub-dominated types including chamise-redshank chaparral, montane chaparral, coastal scrub, and sagebrush, or the shrubs beneath several woodland and forest types. Wildlife management considerations usually focus on selecting alternative fire management treatments. Potential impacts of management actions in mixed chaparral generally are similar to chamise-redshank chaparral.

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CWHR Classification	Ecological Description <sup>1</sup>
Montane Chaparral	<p>Montane chaparral varies markedly throughout California. Species composition changes with elevational and geographical range, soil type, and aspect. One or more of the following species usually characterize montane chaparral communities: whitethorn ceanothus, snow bush ceanothus, greenleaf manzanita, pinemat manzanita, hoary manzanita, bitter cherry, huckleberry oak, sierra chinquapin, silk tassel, Greene goldenweed, mountain mahogany, toyon, sumac and California buckthorn. Montane chaparral is characterized by evergreen species; however, deciduous or partially deciduous species may also be present. Understory vegetation in the mature chaparral is largely absent. Conifer and oak trees may occur in sparse stands or as scattered individuals within the chaparral type. Montane chaparral provides habitat for a wide variety of wildlife. Numerous rodents inhabit chaparral. Deer and other herbivores often make extensive use of chaparral. Throughout the west slope of the Sierra and south through the Transverse Range, deer are strongly associated with chaparral communities. Montane chaparral provides critical summer range foraging areas, escape cover and fawning habitat. In the Sierra, fawning areas are frequently found where the chaparral lies adjacent to or contains an interspersion of perennial grass or meadow-riparian habitat. Some small herbivores use chaparral species in fall and winter when grasses are not in abundance. Rabbits and hares eat twigs, evergreen leaves and bark from chaparral. Shrubs are important to many mammals as shade during hot weather, and moderate temperature and wind velocity in the winter. Many birds find a variety of habitat needs in the montane chaparral. It provides seeds, fruits, insects, protection from predators and climate, as well as singing, roosting and nesting sites. The dynamics of montane chaparral are closely related to fire. Many chaparral shrubs produce new shoots from their stem bases after their crowns have been killed by fire. Tobacco brush is one such species that resprouts prolifically following fire. In addition, tobacco brush and greenleaf manzanita develop banks of seed that remain dormant in the soil until stimulated to germinate following fire. The combination of sprouting and seedling recruitment following fire rapidly replenishes the shrub layer of this community.</p>
Sagebrush	<p>Sagebrush stands are typically large, open, discontinuous stands of big sagebrush of fairly uniform height. Often the habitat is composed of pure stands of big sagebrush, but many stands include other species of sagebrush, rabbitbrush, horsebrush, gooseberry, western chokecherry, curlleaf mountain mahogany, and bitterbrush. The sagebrush type is very important to wildlife because it serves as habitat for some of the more important game animals and occupies such a vast area. It is a major winter-range type for migratory mule deer, and many herds summer in sagebrush-ponderosa pine complexes at middle and high elevations. The sagebrush and its included low sagebrush and bunchgrass types are the principal habitats for pronghorns. The sage grouse is dependent on various successional stages of the type all year. It is also occupied by jackrabbits, cottontail rabbits, ground squirrels, least chipmunk, kangaroo rats, wood rats, pocket mice, deer mice, grasshopper mice, sagebrush vole, and the California bighorn sheep. Birds of the sagebrush type include the chukar, black-billed magpie, gray flycatcher, pinyon jay, sage thrasher, and several sparrows, and hawks. Maintenance of the type is essential for many of these species. Some can benefit from the increased diversity and forage created by the careful use of fire, mechanical brush removal, seeding, or grazing. The most common disturbance factors are wildfire, prescribed burning, seeding to grasses, livestock grazing, and defoliation by larvae of the sagebrush defoliator moth. Stable sagebrush habitats with little herbaceous understory are relatively fire resistant. However, stands subjected to heavy grazing are often invaded by annual grasses and are highly flammable. Stands killed or severely damaged by the larvae of the sagebrush defoliator moth are also subject to wildfire. Fire strongly influences the dynamics of sagebrush-dominated habitat. Sagebrush does not resprout after fire. Although some viable seed may survive a fire, sagebrush has relatively short-lived seed that are wind dispersed and generally do not travel far from the parent plant. Consequently, frequent fires often convert sagebrush-dominated areas to other vegetation types, such as cheatgrass dominated annual grasslands.</p>
Herbaceous Habitats	

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CWHR Classification	Ecological Description <sup>1</sup>
Annual Grassland	<p>Annual grassland habitats are open grasslands composed primarily of annual plant species. Many of these species also occur as understory plants in valley oak woodland and other habitats. Structure in annual grassland depends largely on weather patterns and livestock grazing. Introduced annual grasses are the dominant plant species in this habitat. These include wild oats, soft chess, ripgut brome, red brome, wild barley, and foxtail fescue. Common forbs include broadleaf filaree, redstem filaree, turkey mullein, true clovers, bur clover, popcorn flower, and many others. California poppy, the State flower, is found in this habitat. Perennial grasses, found in moist, lightly grazed, or relic prairie areas, include purple needlegrass and Idaho fescue. Many wildlife species use annual grasslands for foraging, but some require special habitat features such as cliffs, caves, ponds, or habitats with woody plants for breeding, resting, and escape cover. Characteristic reptiles that breed in annual grassland habitats include the western fence lizard, common garter snake, and western rattlesnake. Mammals typically found in this habitat include the black-tailed jackrabbit, California ground squirrel, Botta's pocket gopher, western harvest mouse, California vole, badger, and coyote. The endangered San Joaquin kit fox is also found in and adjacent to this habitat. Common birds known to breed in annual grasslands include the burrowing owl, short-eared owl, horned lark, and western meadowlark. This habitat also provides important foraging habitat for the turkey vulture, northern harrier, American kestrel, white-tailed kite, and prairie falcon.</p>
Perennial Grassland	<p>Perennial grassland habitats, as defined here, occur in two forms in California: coastal prairie, found in areas of northern California under maritime influence, and relics in habitats now dominated by annual grasses and forbs. Relic perennial grasslands are discussed in the section above on annual grassland habitats. Species of perennial grasses are also common in wet meadow and other habitats. The structure of perennial grassland habitats is dependent upon the mix of plant species at any particular site. These habitats are dominated by perennial grass species such as California oatgrass, Pacific hairgrass, and sweet vernal grass. Perennial grassland provides optimum habitat for many species, including the common garter snake, western terrestrial garter snake, northern harrier, barn owl, burrowing owl, western kingbird, Say's phoebe, barn swallow, western meadowlark, savannah sparrow, grasshopper sparrow, Townsend mole, coast mole, Botta's pocket gopher, western harvest mouse, California vole, long-tailed vole, and Oregon vole. In addition, perennial grassland often serves as feeding habitat for the turkey vulture, red-tailed hawk, American kestrel, peregrine falcon, western bluebird, fringe-tailed bat, big brown bat, striped skunk, coyote, black-tailed jackrabbit, brush rabbit, Roosevelt elk, and black-tailed deer. Historically, factors that have affected perennial grassland habitats include the introduction of nonnative annual plant species, increased grazing pressure, elimination of frequent fires, and cultivation. Much of California's perennial grassland has been protected from burning and subject to heavy grazing. Hence, where remnant perennial grasslands remain, properly timed fire and grazing can improve seedling establishment and survival and can increase the basal area of established native plants. In some cases, grassland can benefit from a more frequent fire return interval. However, the application of prescribed fire and range management, in the absence of an established perennial grassland seed source, will not result in a greater distribution of perennial grasses and forbs.</p>

<sup>1</sup>Ecological descriptions are derived from CWHR habitat type descriptions (CWHR 2019)

Source: Compiled by Ascent Environmental in 2019 based on data from CAL FIRE and CDFW